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brilliant purple-white, like an electric arc. These two appeared at 15^h 15^m and 15^h 18^m.

They came from the direction of the radiant, but being parallel I could not tell whether they belonged to the shower.

Many of the other meteors noticed came from a point in *Leo*, but they were not so bright, and had not lasting streaks.

Yours faithfully,
J. WILLOUGHBY MEARES.

Ephemeris of the Leonids; with Introductory Remarks by G. Johnstone Stoney, M.A., D.Sc., F.R.S.

The *Leonids* are extended in the form of a stream along their orbit, the dense part of the stream being about 100,000 miles across, and of such length that it takes between one and two years—probably nearly two years—to pass each point. It is at present advancing towards perihelion, and is therefore lengthening out.

The following Ephemeris is of that situation in the stream through which the Earth passed in 1866. It has been computed from Adams's "Elements" (*Monthly Notices* of the Royal Astronomical Society for 1867 April, p. 250) by applying to the orbit the mean advance in longitude of its node, but without further taking into account the perturbations which *Jupiter*, *Saturn*, and *Uranus* have impressed upon the orbit since 1866. It was judged to be useless to attempt greater accuracy, since Professor Adams's elements are themselves uncertain within considerable limits, owing to the very discordant determinations of the radiant point which he had to make the starting point of his calculations. In fact the differences between the individual determinations and their mean ranged up to as much as a whole degree in both Right Ascension and Declination.

Nevertheless, it is hoped that the Ephemeris will be sufficient for the use for which it is intended—viz. to enable astronomers to make their first attempt next spring to obtain a photograph of the meteors while at a distance in the open sky. It will be seen from the Ephemeris that next spring they will be nearly as far off as *Saturn*, whose crape ring (formed of bodies separated like the meteors at a distance from one another) is visible at the ansæ, under favourable circumstances, in observations which are mere eye observations, and notwithstanding the close proximity of bright bodies on all sides. It follows that a very much fainter object might be successfully photographed in a dark part of the sky. Any computation, however, which we can make leads to the conclusion that the meteor stream is so excessively faint that we must not be discouraged if our best efforts on this occasion are unsuccessful. It will in that case be desirable to renew the attempt in the spring of 1898, when the stream will have got nearer to the Sun, and will have become brighter under his beams.

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Next spring the stream will be drawn out to an apparent length of at least 5°—possibly 8°—so that if it can be photographed at all it will present the appearance of a streak the whole way across the photographic plate, and about 20″ wide. The uncertainty of the data for the Ephemeris makes it desirable that a full field on each side of that track which is indicated by the Ephemeris shall be explored.

The Ephemeris has been computed by Mr. Wright, of the *Nautical Almanac* Office, under Dr. Downing's special direction, which he most kindly gave; and the cost of making the calculations has been defrayed out of the Donation Fund of the Royal Society.

It is probable that no observations can be made next January, owing to the low position of the swarm in the eastern sky and the approach of dawn, nor in the middles of the succeeding months on account of moonlight, but in the early and late portions of February, March, and April everything will be favourable. The position of the swarm will become more convenient for observation as the season advances, until in April the best conditions will prevail. Soon after that twilight will be troublesome.

Approximate Ephemeris of the Leonids for the first four months of 1897.

Greenwich Midnight.	Right Ascension.	Decl.	Log. of Dist. from Earth.	Greenwich Midnight.	Right Ascension.	Decl.	Log. of Dist. from Earth.
1897.	h m s	° ′		1897.	h m s	° ′	
Jan. 1	14 28 19	S 8 39	0·9976	Jan. 22	14 30 1	S 8 29	0·9768
2	14 28 28	8 39	0·9967	23	14 30 1	8 28	0·9757
3	14 28 36	8 39	0·9957	24	14 30 1	8 27	0·9747
4	14 28 44	8 39	0·9948	25	14 30 1	8 26	0·9736
5	14 28 52	8 39	0·9938	26	14 30 0	8 25	0·9726
6	14 28 59	8 38	0·9929	27	14 29 59	8 24	0·9715
7	14 29 5	8 38	0·9919	28	14 29 57	8 23	0·9704
8	14 29 12	8 38	0·9909	29	14 29 55	8 22	0·9694
9	14 29 18	8 37	0·9900	30	14 29 52	8 20	0·9683
10	14 29 24	8 37	0·9890	31	14 29 50	8 19	0·9672
11	14 29 29	8 37	0·9880	Feb. 1	14 29 47	8 18	0·9662
12	14 29 34	8 36	0·9870	2	14 29 43	8 17	0·9651
13	14 29 38	8 36	0·9860	3	14 29 38	8 15	0·9640
14	14 29 42	8 35	0·9850	4	14 29 33	8 14	0·9630
15	14 29 46	8 34	0·9840	5	14 29 27	8 12	0·9619
16	14 29 49	8 34	0·9830	6	14 29 22	8 11	0·9608
17	14 29 52	8 33	0·9820	7	14 29 16	8 9	0·9598
18	14 29 54	8 32	0·9809	8	14 29 9	8 8	0·9587
19	14 29 56	8 32	0·9799	9	14 29 2	8 6	0·9576
20	14 29 58	8 31	0·9789	10	14 28 54	8 4	0·9565
21	14 30 0	8 30	0·9778	11	14 28 46	8 3	0·9555

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Greenwich Midnight.	Right Ascension.	Decl.	Log. of Dist. from Earth.	Greenwich Midnight.	Right Ascension.	Decl.	Log. of Dist. from Earth.
1897.	h m s	° ′		1897.	h m s	° ′	
Feb. 12	14 28 38	S 8 1	0·9544	Mar. 24	14 16 48	S 6 22	0·9164
13	14 28 29	7 59	0·9533	25	14 16 22	6 19	0·9157
14	14 28 19	7 58	0·9523	26	14 15 55	6 16	0·9150
15	14 28 9	7 56	0·9512	27	14 15 28	6 12	0·9143
16	14 27 59	7 54	0·9501	28	14 15 1	6 9	0·9136
17	14 27 48	7 52	0·9491	29	14 14 33	6 6	0·9129
18	14 27 37	7 50	0·9480	30	14 14 5	6 3	0·9122
19	14 27 25	7 48	0·9470	31	14 13 37	6 0	0·9115
20	14 27 13	7 46	0·9459	Apr. 1	14 13 9	5 57	0·9109
21	14 27 0	7 44	0·9449	2	14 12 41	5 53	0·9103
22	14 26 47	7 41	0·9438	3	14 12 12	5 50	0·9097
23	14 26 34	7 39	0·9428	4	14 11 43	5 47	0·9091
24	14 26 20	7 37	0·9418	5	14 11 14	5 44	0·9085
25	14 26 5	7 35	0·9408	6	14 10 45	5 40	0·9079
26	14 25 50	7 33	0·9398	7	14 10 15	5 37	0·9074
27	14 25 35	7 30	0·9383	8	14 9 45	5 34	0·9069
28	14 25 19	7 28	0·9378	9	14 9 15	5 31	0·9064
Mar. 1	14 25 3	7 25	0·9368	10	14 8 45	5 27	0·9059
2	14 24 46	7 23	0·9358	11	14 8 15	5 24	0·9054
3	14 24 28	7 21	0·9348	12	14 7 45	5 21	0·9050
4	14 24 10	7 18	0·9338	13	14 7 14	5 18	0·9045
5	14 23 52	7 16	0·9329	14	14 6 43	5 14	0·9041
6	14 23 33	7 13	0·9319	15	14 6 12	5 11	0·9037
7	14 23 14	7 10	0·9310	16	14 5 41	5 8	0·9033
8	14 22 55	7 8	0·9300	17	14 5 10	5 5	0·9029
9	14 22 35	7 5	0·9291	18	14 4 39	5 1	0·9026
10	14 22 15	7 3	0·9282	19	14 4 7	4 58	0·9023
11	14 21 54	7 0	0·9273	20	14 3 36	4 55	0·9020
12	14 21 33	6 57	0·9264	21	14 3 4	4 52	0·9017
13	14 21 11	6 54	0·9255	22	14 2 32	4 48	0·9014
14	14 20 49	6 51	0·9246	23	14 2 1	4 45	0·9011
15	14 20 27	6 49	0·9237	24	14 1 30	4 42	0·9009
16	14 20 4	6 46	0·9229	25	14 0 58	4 39	0·9007
17	14 19 41	6 43	0·9220	26	14 0 27	4 36	0·9005
18	14 19 17	6 40	0·9212	27	13 59 56	4 33	0·9003
19	14 18 53	6 37	0·9203	28	13 59 24	4 29	0·9001
20	14 18 29	6 34	0·9195	29	13 58 53	4 26	0·9000
21	14 18 4	6 31	0·9187	30	13 58 22	4 23	0·8998
22	14 17 39	6 28	0·9179	May 1	13 57 50	4 20	0·8997
23	14 17 14	6 25	0·9172				

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Observations of the Leonid Meteors, 1896, *at the Oxford University Observatory.*

(*Communicated by H. H. Turner, M.A., B.Sc., Director.*)

On November 13 the night was thickly overcast with fog, and no meteors were seen.

On November 14 a watch was kept by Mr. F. A. Bellamy and Mr. F. C. H. Carpenter from 9^h till 16^h.

Mr. Carpenter commenced to watch at $11^h\ 15^m$ for any meteors that might appear about the constellation *Leo*, with instructions to note the number counted every quarter of an hour, and to locate any specially bright ones. None were seen from $11^h\ 15^m$ to 12^h, individual meteors were seen at $12^h\ 4^m$, $13^h\ 7^m$, $13^h\ 13^m$, and $13^h\ 58^m$; at $14^h\ 15^m$ the sky became overcast and remained so till $15^h\ 30^m$. Cloud was frequent throughout the period of watch.

Preparations were made by Mr. F. A. Bellamy to photograph the radiant point. Two cameras were fixed to the telescope in the De la Rue dome, and one to the Astrographic telescope; a plate was also exposed in the latter telescope; both telescopes were pointed at R.A. 10^h and Dec. +20°. No meteor tracks were found on the plates.

Cloudy weather with drizzling rain prevented any attempt being made to photograph the *Andromedes* on November 27.

The Aurora of 1896 *March* 4. By T. W. Backhouse.

The aurora of March 4 was observed here, though not by myself before $10^h\ 57^m$. A ray, probably the same as that noted by Mr. Goatcher at Cambridge, was seen by my secretary as a conspicuous feature, being at $8^h\ 27^m$ G.M.T. almost vertically under the *Pleiades*, pointing to those stars, and reaching, bright, to half, thence gradually fainter to five-sixths their altitude; it had moved slightly and slowly southwards during the previous five minutes. There is uncertainty as to whether this feature was sufficiently inclined to the vertical as seen here to be a true and perfect auroral ray; while at Cambridge the inclination was too great. It is not professed that the inclination is accurately given at either place; but unless there is considerable error in the descriptions it would appear that the phenomenon was a bundle of rays rather than a single one, and that the lower portion was further east than the upper. It is clear that a true auroral ray was seen later in the evening by other observers, according to